The effect of Palisade plant growth regulator on the performance of soft winter wheat 2012 - 2013

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Field trials were conducted in 2012 and 2013 to observe the effect of Palisade® plant growth regulator on the performance of soft winter wheat. Palisade (Trinexapac-ethyl), a Syngenta product, is purported to inhibit the production of gibberellic acid, thereby shortening internodes and reducing the risk of plant lodging.

Procedure

A randomized complete block design with four replications was superimposed on commercial stands of soft white winter wheat (cv. Syngenta 1062 in 2012 and cv. Ambassador in 2013) on a silt loam soil in the Thumb region of Michigan. Individual plots measured 20 x 75 feet and the harvest area was 16.5 x 70 feet. During 2012, a 2 pound active ingredient per gallon EC formulation of Palisade was used, whereas in 2013 a 1 pound EC formulation was applied (the rates provided in the tables below are adjusted to equate to the one pound gallon formulation).

The Palisade treatments are listed in the tables. The treatments included various product rates during Feekes growth stage 7 (second joint) and application timings utilizing 12 oz during growth stages 6, 7 and 8 (first joint, second joint and flag leaf emergence, respectively). The treatments also included a split treatment where the product was applied at growth stages 6 and 8. The trial area received a relatively high rate of nitrogen (155 lb/ac) to increase the chance of lodging. The applications were made with the use of a tractor mounted boom sprayer that delivered 13 gallons of water per acre through Turbo TeeJet 02 nozzles under45 psi of pressure. All treatments received Prosaro fungicide at early flowering to reduce disease pressure.

Prior to harvest, plant height, heads number and the percent of lodged plants were determined. In 2012, tiller samples were also collected to determine internode length and stem diameter. The trial was harvested with an International 2144 combine equipped with a Juniper HarvestMaster system that provided grain yield, test weight, and moisture. At harvest, grain samples were taken for measuring 1000-kernel weight. Statistical analyses were performed by the Statistical Consulting Center at MSU.

Results:

Lodging was significantly reduced with the use of Palisade (table 1). The reduction tended to be more pronounced with earlier application timings and increased rates of product. The split application treatment was one of the most effective in reducing lodging in 2012, but among the least effective in the 2013 trial. There was a strong correlation between plant height and plant lodging each season.

Table 1: Effect of Palisade on plant lodging, plant hieght and grain yield of soft winter wheat, Deckerville, MI, 2012 & 2013

Comparisons	Rate oz/ac[1] (1lb a.i. per gal)	Growth stage[2]	2012[4] lodging %	2012[4] height inches	2012[4] yield bu/ac	2013[4] lodging %	2013[4] height inches	2013[4] yield bu/ac
nontreated	0	---	11 a	35 a	93 b	48 a	36 a	103 a
split appl.:	5 & 5	6 & 8	2 bc	33 bc	105 a	29 ab	34 ab	101 a
application timings:	12	6	0 c	33 bc	101 ab	--	--	--
	12	7[3]	3 bc	33 bc	99 ab	8 bc	33 b	105 a
	12	8	5 ab	34 ab	98 ab	18 b	33 bc	102 a
application rates:	8	7	--	--	--	25 ab	34 ab	102 a
	10	7	7 ab	33 bc	100 ab	16 b	34 ab	106 a
	12	7[3]	3 bc	33 bc	99 ab	8 bc	33 b	105 a
	14	7	1 bc	31 c	100 ab	0 c	32 b	103 a

[1] rate based on 1 lb active ingredient per gallon formulation.

[2] Feekes growth stage 6 (first joint); 7 (second joint); and 8 (flag leaf emergence).

[3] same data source used for application timing and rate comparisons.

[4] data within a column followed by the same letter are not significantly different (P ≥ .05)

Table 2: Effect of Palisade on harvest moisture, test weight and thousand kernel weight of soft winter wheat grain, Deckerville, MI, 2012 and 2013

Comparisons	Rate oz/ac[1] (1lb a.i. per gal)	Growth stage[2]	2012[4] moist. %	2012[4] test wt lbs	2012[4] 1000 K. wt. gms	2013[4] moist. %	2013[4] test wt lbs	2013[4] 1000 K. wt. gms
nontreated	0	---	13.0	61.7	32.3	19.2	58.2	39.9
split appl.:	5 & 5	6 & 8	13.1	61.6	32.6	18.3	58.6	39.3
application timings:	12	6	13.2	61.5	31.7	---	---	---
	12	7[3]	13.1	61.7	31.8	18.3	58.6	38.5
	12	8	13.0	61.7	33.2	18.6	58.5	38.9
application rates:	8	7	---	---	---	17.9	58.8	37.8
	10	7	13.1	61.6	31.8	17.9	58.8	36.9
	12	7[3]	13.1	61.7	31.8	18.3	58.6	38.5
	14	7	13.1	61.6	31.7	18.1	58.7	39.4

[1] rate based on 1 lb active ingredient per gallon formulation.

[2] Feekes growth stage 6 (first joint); 7 (second joint); and 8 (flag leaf emergence).

[3] same data source used for application timing and rate comparisons.

[4] no statistically significant differences (P ≥ .05)

Plant height, as measured in the field, was reduced by 1 to 4 inches with the use of Palisade (table 2). Based on observations in 2012, the peduncle (stem region from uppermost node to base of grain head) contributed the greatest reduction (table 3). Internodes were also shortened, with reductions in lengths declining from the upper-most internode (labeled 4th internode in table 3) to the lowest measured internode (2nd internode). Caliper measurements of the peduncle immediately below the head suggested that slight stem thickening occurred (table 3), though only the 12 oz/ac of applied at growth stage 8 was statistically significant. Stem thicknesses immediately below the uppermost node (culm node) were inconsistent (data not shown).

Table 3: Effect of Palisade on internode length and stem diameter of soft winter wheat, Deckerville, MI 2012 [4]

Comparisons	Rate oz/ac[1] 1lb a.i. per gal	Growth stage [2]	2nd internode length, cm	3rd internode length, cm	4th internode length, cm	peduncle length cm	peduncle diameter mm
nontreated	0	---	9.5	13.8	19.6	34.1 a	1.78 b
split appl.:	5 & 5	6 & 8	8.9	12.7	17.8	31.1 ab	1.80 ab
application timings:	12	6	8.6	12.4	18.0	31.6 ab	1.81 ab
	12	7 [3]	7.9	12.0	17.3	30.5 ab	1.84 ab
	12	8	8.6	12.8	17.6	30.6 ab	1.84 a
application rates:	10	7	8.2	12.7	17.6	32.0 a	1.81 b
	12	7 [3]	7.9	12.0	17.3	30.5 ab	1.84 ab
	14	7	8.9	12.7	17.8	31.1 b	1.80 ab

[1] rate based on 1 lb active ingredient per gallon formulation.

[2] Feekes growth stage 6 (first joint); 7 (second joint); and 8 (flag leaf emergence).

[3] same data source used for application timing and rate comparisons.

[4] data within a column followed by the same letter are not significantly different (P ≥ .05)

During the 2012 season, there tended to be a slight improvement in grain yield although only the split treatment provided a statistically significant difference. In 2013, there was no effect on grain yield. There were no significant differences in grain moisture, test weight, or 1000-kernel weight (table 2), nor were there differences in head numbers (data not shown).

Comments:

In this two year study, the use of Palisade significantly reduced plant lodging. There was little if any boost in grain yields with the use of Palisade, neither was there any negative effects observed. The Palisade EC label rates range from 12 to 14.4 oz/ac and the timing for application is from growth stage 5 (fully tillered) to growth stage 8 (flag leaf visible). This research suggests that a low rate (10 to 12 oz of the 1 pound EC formulation) may be sufficient if applied before the flag leaf emerges and lodging proves less than severe. As growers gain experience with this product, they would do well to note any differences in its performance based on variety, crop stresses, and tank mixes.